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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,101	02/12/2001	Govinda Nallappa Rajan	2	9726

22046 7590 05/05/2004

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EXAMINER	
CURS, NATHAN M	

ART UNIT	PAPER NUMBER
2633	6

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/782,101	RAJAN, GOVINDA NALLAPPA	
	Examiner	Art Unit	
	Nathan Curs	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 February 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 3.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagashima et al. (US Patent No. 4608682).

Regarding claim 1, Nagashima et al. disclose a method of buffering, during at least a predetermined retention time (col. 1, lines 45-53), a digital optical signal having a predetermined digital level (col. 3, lines 39-46), comprising: inputting the optical signal to an optical input of a semiconductor laser element (col. 3, lines 46-50 and col. 4, lines 14-24); and injecting an injection current to said semiconductor laser element to establish an optical gain process in said semiconductor laser element (col. 4, lines 25-39), the injection current having an amplitude such that said optical gain process and an optical absorption process within said semiconductor laser element balance one another longer than said retention time in order to keep said digital optical signal on said predetermined digital level during said retention time (col. 4, lines 25-53).

Regarding claim 2, Nagashima et al. disclose outputting said optical signal to an output line (fig. 2, element 17) by means of an optical output switch connected between an output of said semiconductor laser element and said output line (fig. 2, element 100 and col. 3, lines 50-56).

Regarding claim 3, Nagashima et al. disclose the step of, prior to the inputting step, clearing said semiconductor laser element by turning off said injection current during a predetermined clearing time period (col. 4, lines 62-68).

Regarding claim 4, Nagashima et al. disclose a method of time division multiplexing of a plurality of digital optical signals each having a predetermined digital level (col. 3, lines 39-46), comprising: inputting each of the optical signals to an optical input of one of a plurality of semiconductor laser elements (col. 3, lines 46-50 and col. 4, lines 14-24); injecting a distinct injection current to each of said semiconductor laser elements to establish an optical gain process in each of said semiconductor laser elements (col. 4, lines 25-39), each injection current having an amplitude such that said optical gain process and an optical absorption process within each of said semiconductor laser elements balance one another longer than a predetermined retention time in order to keep each of said digital optical signals on each of said predetermined digital levels during said retention time (col. 4, lines 25-53); and consecutively outputting each of said optical signals to one output line in consecutive time frames by means of a plurality of optical output switches, each one of said plurality of output switches being connected between an output of one of said semiconductor laser elements and said output line (fig. 2, elements 17, 26, and 100 and col. 3, lines 50-56).

Regarding claim 5, Nagashima et al. disclose the step of, prior to the inputting step, clearing said semiconductor laser element by turning off said injection current during a predetermined clearing time period (col. 4, lines 62-68).

Regarding claim 6, Nagashima et al. disclose an arrangement for buffering, during at least a predetermined retention time (col. 1, lines 45-53), a digital optical signal having a predetermined digital level (col. 3, lines 39-46), comprising: a semiconductor laser element with an optical input for receiving the optical signal (col. 3, lines 46-50 and col. 4, lines 14-24); and a

current source connected to said semiconductor laser element and arranged to inject an injection current to said semiconductor laser element to establish an optical gain process in said semiconductor laser element (col. 4, lines 25-39 and col. 5, lines 1-18), the injection current having an amplitude such that said optical gain process and an optical absorption process within said semiconductor laser element balance one another longer than said retention time in order to keep said digital optical signal on said predetermined digital level during said retention time (col. 4, lines 25-53).

Regarding claim 7, Nagashima et al. disclose a controller connected to said current source to provide a current control signal to said current source to control an amplitude of said injection current (fig. 2, element 20 and col. 5, lines 1-18).

Regarding claim 14, Nagashima et al. disclose an arrangement for time division multiplexing of a plurality of digital optical signals each having a predetermined digital level (col. 3, lines 39-46), comprising: a plurality of semiconductor laser elements each having an optical input for receiving one of said optical signals (col. 3, lines 46-50 and col. 4, lines 14-24); a current source connected to said semiconductor laser elements for injecting a distinct injection current to each of said semiconductor laser elements to establish an optical gain process in each of said semiconductor laser elements (col. 4, lines 25-39 and col. 5, lines 1-18), each injection current having an amplitude such that said optical gain process and an optical absorption process within each of said semiconductor laser elements balance one another longer than a predetermined retention time in order to keep each of said digital optical signals on each of said predetermined digital levels during said retention time (col. 4, lines 25-53); a plurality of optical output switches, each one of said plurality of output switches being connected between an output of one of said semiconductor laser elements and one output line (fig. 2, elements 17, 26, and 100 and col. 3, lines 50-56); and a controller connected to said plurality of

optical output switches to control consecutively outputting each of said optical signals to said output line in consecutive time frames (fig. 2, elements 20 and 100, and col. 3, lines 50-56).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagashima et al. (US Patent No. 4608682).

Regarding claim 8, Nagashima et al. disclose an optical detector arranged to detect the optical power content of a bistable semiconductor device and to provide a feedback signal to the electrode of the bistable device to control the bistable device (col. 7, line 59 to line col. 8, line 14), but do not disclose that the bistable semiconductor device is a laser in this feedback configuration or disclose providing the feedback signal to said controller, said controller being arranged to generate said current control signal in dependence on said feedback signal. It would have been obvious to an artisan at the time of the invention to use the detector feedback configuration disclosed by Nagashima et al. with the bistable semiconductor laser devices also disclosed by Nagashima et al. (fig. 2, elements 81-84) to control the injection current to the lasers, and it would have been obvious to route the feedback signal to the controller (fig. 2, element 20), as the controller, as disclosed by Nagashima et al., controls the injection current level for the semiconductor laser devices (fig. 2, element 20 and col. 5, lines 1-18).

Regarding claim 9, Nagashima et al. disclose an optical output switch connected between an output of said semiconductor laser element and an output line, and connected to

said controller to receive an output switch control signal to control outputting said optical signal to said output line (fig. 2, elements 20 and 100, and col. 3, lines 50-56).

5. Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagashima et al. (US Patent No. 4608682) in view of Yoshida et al. (US Patent No. 6104477).

Regarding claim 10, Nagashima et al. do not disclose an optical output directional filter connected between said output of said semiconductor laser element and said optical output switch. Yoshida et al. disclose a direction filter between a laser and an optical switch (fig. 1, elements 10, 17 and 18 and col. 2, lines 14-22), for suppressing downstream optical noise leaks from reaching the upstream optical source. It would have been obvious to an artisan at the time of the invention to add the directional filter disclosed by Yoshida et al., between the laser and optical output switch of Nagashima et al. to suppress optical noise leaks from reaching the laser.

Regarding claim 11, Nagashima et al. disclose an optical input switch connected to said input of said semiconductor laser element (fig. 2, element 60 and col. 3, lines 46-50), and connected to said controller to receive an input switch control signal to control inputting said optical signal to said semiconductor laser element (fig. 2, elements 20 and 60 and col. 4, lines 62-68).

Regarding claim 12, Nagashima et al. do not disclose an optical input directional filter connected between said input of said semiconductor laser element and said optical input switch. Yoshida et al. disclose a direction filter adjacent and downstream from an optical switch (fig. 1, elements 20 and 21 and col. 2, lines 29-35), for directing transmission in one direction. It would have been obvious to an artisan at the time of the invention to add the directional filter disclosed

by Yoshida et al., between the input of the laser and the optical input switch of Nagashima et al. to direct transmission in one direction toward the laser.

Regarding claim 13, Nagashima et al. disclose that said controller is arranged for controlling said current source such that said current source clears said semiconductor laser element by turning off said injection current during a predetermined clearing time period prior to switching said digital optical signal to said semiconductor laser element by said optical input switch (col. 4, lines 62-68).

6. Applicant's arguments filed 17 February 2004 have been fully considered but they are not persuasive.

Regarding applicant's argument for claims 1, 4, 6 and 14, and dependent claims, the applicant argues that Nagashima et al. disclose that the injection current during the retention time is beyond the threshold of laser operation so as to give significant optical output A or B. However, The values A or B of Nagashima et al. represent the data values of 0 or 1 when the output switch is opened to release the data value held by the optical memory, comparable to the 0 or 1 values of the applicant (specification page 6, lines 25-30). Further, the injection current i_b of Nagashima et al. is not beyond the threshold of laser operation as argued by the applicant. The applicant describes the operation of the laser as follows: above the threshold value the laser exhibits a sharp increase in optical gain, followed by the gain increasing linearly; below the threshold value the laser exhibits loss exceeding gain and stimulated emission cannot be sustained; and at the threshold value gain equals loss and stimulated emission begins to dominate (specification page 5, lines 7-20). Nagashima et al. disclose this same behavior: at injection current i_a or higher, the laser exhibits a sharp increase in optical gain, followed by the gain increasing linearly; at injection current i_c or lower, the laser exhibits loss exceeding gain

and stimulated emission cannot be sustained; and at injection current i_b, either optical input value, 0 or 1, can be sustained in the element (figs. 3b and 3c, and col. 4, lines 25-53), where the previous state is retained unless the element is reset, and where an optical input signal value of 1 (represent by Pt in the disclosure of Nagashima et al.) is what produces the setting of the element output to the "B" level, not increasing gain of the element by itself. Thus, since the Nagashima et al. element at injection current i_b exhibits stability for either a 0 or 1 value, and is further dependent on the optical input signal for the setting of the value held, the element of Nagashima et al. at this injection current is exhibiting neither increasing gain nor decreasing ability to sustain emission. In other words, the gain and absorption processes are balanced at injection current i_b. Since the 0 or 1 value is held in the element of Nagashima et al. until such time as the element is reset, the element is in balance longer than the necessary retention time for holding a data value.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

8. Any inquiry concerning this communication from the examiner should be directed to N. Curs whose telephone number is (703) 305-0370. The examiner can normally be reached M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached at (703) 305-4729. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

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